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Trigonidium lankesteri

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Tribe CYMBIDIEAE
Subtribe MAXILLARIINAE
Genus TRIGONIDIUM *Lindl.*

Trigonidium lankesteri Ames, *Schedulae Orchidiana* 5: 32–34. 1923. *Maxillaria luisae* Molinari, *Richardiana* 15:302. 2014 [2015]. Type: Costa Rica: Las Cónnavas, in cultivation, February 1923, C.H. Lankester 367 (holotype AMES). *Trigonidium amparoanum* Schltr., *Repert. Spec. Nov. Regni Veg. Beih.* 19:61 1923 (type: Costa Rica. San José: Carrillo [Carrillo], blühend im Juni 1921, C. Wercké 26, destroyed in B).

Epiphytic, repent, large herb up to 1 m tall. Rhizome cylindrical, 5–8 mm in diameter, 9–13 cm long between pseudobulbs, completely covered by closely appressed, tubular, obtuse, brown, papyraceous bracts ca. 2 cm long. Roots produced at the base of the pseudobulbs, ca 1.5 mm in diameter. Pseudobulbs ovoid, slightly compressed, yellow–green, deeply sulcate when old, up to 8 × 3 cm, subtended by rigid imbricating sheaths, apically three- to five-leaved. Leaves distichous, narrowly lanceolate, acute, 22–27 × 3–4 cm wide, thinly coriaceous, contracted at the base into a conduplicate petiole imbricating the pseudobulb, ca. 5 cm long. Inflorescence single-flowered, erect, produced from the base of newly developing pseudobulb, the peduncle thick, 5–8 cm long, covered by short, amplexant, triangular, acute bracts. Floral bract large, almost completely covering the ovary, oblong, obtuse, apically loose, to 5 cm long. Pedicellate ovary terete–clavate, to 5.5 cm long. Flower large, the sepals connate at the base into a short tube, apically spreading–reflexed, cream–maroon, finely veined with purple, the lateral sepals with a pair of orange spots above the middle; the petals tan, veined brown, with a distinct, shiny, violet blotch toward the apex; the lip creamy white. Dorsal sepal oblanceolate from a rectangular claw, acute, reflexed in the apical third, 5.0 × 1.6–2.0 cm, connivent at the base with the lateral sepals. Lateral sepals oblong, subfalcate, asymmetrical, acute, 5.0 × 2.0–2.5 cm, connivent at the base, reflexed in the apical third. Petals broadly oblanceolate–spathulate, apiculate, 2.2–2.5 × 1.1–1.3 cm, waxy, with a thickened,

excavate callus on the inside near the tip, the apical margins thickened–incurved. Lip trilobed, narrowly oblong, 15–17 × 4.5–5.0 rounded, emarginate, the apical half deeply conduplicate, reflexed; lateral lobes erect, the free portion ca. 2 mm long, triangular–acute; midlobe 8 mm long, oblong, the upper surface minutely glandular, abaxially heavily verrucose along the middle; disc with a median, minutely glandular, rounded callus. Column semiterete, stout, fleshy, 1 cm long, the apical margins thickened toward the apex into low, indistinct, elliptic wings; the stigma ovoid, the rostellum transversal. Anther cap umbonate, galeate–cucullate, dorsally long–papillose. Pollinia two, cleft, reniform, laterally flattened, on a semilunate, apically triangular–acute stipe and a saddle-shaped, brown viscidium.

The remarkable and beautiful genus *Trigonidium* (now part of a much larger *Maxillaria* based on molecular (DNA) analyses) was first described in 1837 by John Lindley from a “curious plant” that James Bateman sent to him in August 1836 (Lindley 1837). Bateman included a note expressing his expectation that it was a distinct genus, a suspicion that was confirmed when the curious flowers opened. Lindley published the new genus, providing a beautiful colored illustration of *Trigonidium obtusum* (the type of the genus), in Volume 23 of *Edwards’s Botanical Register* (Lindley 1837). In the description, he added a note on the genus name: “Named in allusion to the triangular form of several parts; the sepals form a 3-cornered cup, the gland on which the pollen masses rest is an obtuse-angled triangle; and the stigma is a triangular excavation.”

Lindley himself pointed out that *Trgdm. obtusum* belongs to a set of *Maxillaria*-like plants. Indeed, *Trigonidium* belongs to the subtribe Maxillariinae *sensu* Dressler (1993), one of the most diverse subtribes of Neotropical Orchidaceae. “The core Maxillariinae” consist of eight genera (*Anthosiphon*, *Chrysocycnis*, *Cryptocentrum*, *Cyrtidiorchis*, *Maxillaria*, *Mormolyca*, *Pityphyllum* and *Trigonidium* — now all included by the World Checklist of Selected Plant Families as part of *Maxillaria*) that are characterized by the presence of conduplicate leaves (never plicate), single-flowered inflorescences,

four pollinia (sometimes fused into two) with or without a stipe attached to a viscidium, and usually a prominent column foot that is typically persistent in the fruit (Whitten et al. 2007). According to the phylogenetic study by Whitten and co-workers (2007), *Trigonidium* is closely related to *Brasiliorchis*, (previously recognized as the *Maxillaria picta* alliance) and to *Christensonella* (previously the *Maxillaria madida* alliance). However, *Trigonidium* species can be easily distinguished from their relatives by the large, funnel-shaped flowers, with the reflexed, apical portion of the lateral sepals giving them a triangular shape when observed from the front. The laterally compressed pseudobulbs may bear one, two or up to five leaves (Whitten et al. 2007). Currently, the genus *Trigonidium* comprises seven accepted species ranging from Mexico to Bolivia (Whitten 2009).

Although most species of *Trigonidium* are medium-sized, caespitose epiphytes, some have a distinct repent habit, with thick and long, frequently branching rhizomes, forming large and intricate plants. George Bentham and Joseph D. Hooker described the first rhizomatous species of *Trigonidium* in the third volume of their *Genera Plantarum* (1883) as *Trigonidium insigne*, following a suggestion by Reichenbach filius on the sheet of a specimen collected by Purdie in Colombia and kept in Hooker’s herbarium. They only had an imperfect flower, but it was so large compared to other *Trigonidium* species that the two authors even suspected it belonged to a different genus (Bentham and Hooker 1883).

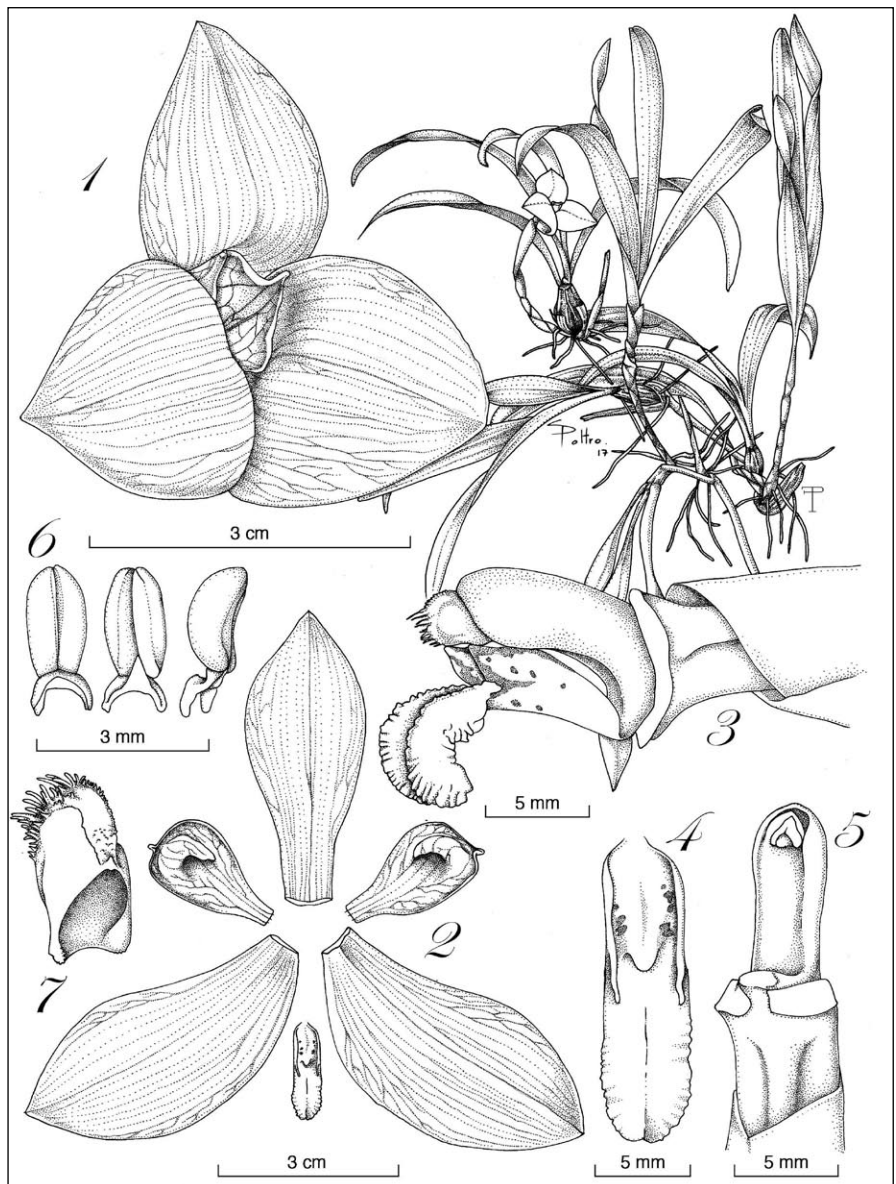
Forty years elapsed before a new large-flowered, repent species of *Trigonidium* surfaced from Costa Rica, and to make a clear statement, it appeared two times, with two different names, in less than six months. The type specimen of *Trgdm. lankesteri* was cultivated in Charles H. Lankester’s garden at Las Cónnavas, near Cartago, where it flowered in February 1923, and bears no information about the original collecting locality. Several years later, in a manuscript that Lankester prepared during the 1950s, he recorded *Trgdm. lankesteri* as “a rare plant of wide distribution,” which he had observed at Laguna Congo, in the lower Sarapiquí

Valley in the Central Cordillera, and near Navarro, on the Caribbean slopes of the Talamanca chain (Lankester 2013).

His friend Oakes Ames described the new species in his honor and published it in June 1923, in the fifth issue of his *Schedulae Orchidianae*. Rudolf Schlechter described it again that same year, but his *Trigonidium amparoanum*, published in October 1923 on the basis of a collection by Carl Wercklé, was predated by Ames' *Trgdm. lankesteri* by a few months. Besides the holotype plant, burnt in Berlin, no other type materials referable to *Trgdm. amparoanum* have been found, but the rhizomatous habit, the short inflorescence and the large flowers described in the protologue leave no doubt about the identity of this taxon. When a broader concept of *Maxillaria* is favored, *Trgdm. lankesteri* has to be treated as *Maxillaria luisae*, an avowed name that does not retain any relationship with the original country, discoverer and author of this remarkable species.

Dressler (1993) treated *Trgdm. lankesteri* as a synonym of *Trgdm. insigne*, but the latter has much narrower sepals, distinctly triangular in the reflexed portion. They are paler, yellowish in color, with a much less distinct purple venation. Furthermore, the petals of *Trgdm. insigne* end in a long-acuminate mucron. Costa Rica is home to three species: *Trgdm. lankesteri*, *Trigonidium egertonianum* and *Trigonidium riopalenquense*. They can be found mostly in warm rainforests, even though *Trgdm. lankesteri* also reaches the intermediate, premontane regions along the Caribbean slopes of central Costa Rica.

Trigonidium obtusum was speculated in the past to be pollinated through a pseudocopulatory syndrome (Van der Pijl & Dodson 1966), but no direct evidence was produced until recently, when Singer (2002) demonstrated pollinarium removal by the eusocial bee *Plebeia droryana* drones (Apidae: Meliponinae). The drones are initially attracted by the floral volatiles that may mimic female pheromones and the visual signals that reinforce the female-like flower appearance. The trap-morphology of the flowers and the waxy surface of the petals allow catching the sexually excited drones that slip down into the flower when attempting to copulate either with the sepals or petals. In the attempts to escape, the bees access the space between the lip and the column and the pollinarium is fixed on their scutellum (Singer 2002). *Trgdm. obtusum* pseudocopulatory pollination was the first



report of this kind in the Maxillariinae, but it has also been studied in *Chrysocycnis*, *Cyrtidiorchis* and *Mormolyca*, and may have evolved at least four times within the Maxillariinae (Whitten et al. 2007).

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Trigonidium lankesteri. The plant.

1. flower;
2. dissected perianth;
3. column and lip, lateral view;
4. lip, ventral view;
5. column, three-quarters view;
6. pollinarium, three views;
7. anther cap.

All drawn from *F. Pupulin 5155* (JBL) by Franco Pupulin and Sara Poltronieri.

Whitten, W.M., M.A. Blanco, N.H. Williams, S. Koehler, G. Carnevali, R.B. Singer, L. Endara, and K.M. Neubig. 2007. Molecular phylogenetics of *Maxillaria* and related genera (Orchidaceae: Cymbidieae) based on combined molecular data sets. *American Journal of Botany* 94:1860–1889.